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TIMBER CUTTING TO ENHANCE WILDLIFE FOOD SUPPLIES

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Abstract:

Thirty-four genera of woody plants have high ratings as producers of wildlife food in the Northeast. Thirty of these (90 percent) regenerate, grow faster, and supply more food where there is ample sunlight, a condition which can be created by commercial timber harvests. Silvicultural systems to accomplish this are discussed. Attention must be paid to the principles of diversity, interspersion, and sustained yield whenever cutting covers large areas. A wildlife-oriented timber management plan using these principles is presented.

Forest land is unique in that it furnishes wildlife foods from so many different sources. Examples: bears eat fleshy fruits, bluejays - acorns, crossbills - pine seeds, deer - leaves and twigs, grouse - buds, beavers - wood and inner bark, sapsuckers - sap and cambium tissue, and honeybees - flower nectar.

This availability of so many different kinds of food is one of the main reasons why forest land provides habitat for so many more wildlife species than other kinds of habitat. Yeager (1961) gives evidence that two-thirds of all species of land birds and mammals in the United States have primary or secondary dependence on land where woody vegetation pre-

dominates. Significantly, such lands make up only one-third of the total habitat available.

Webb (1973) says that forests are unique because they are a three-dimensional environment and have considerably more height (or depth) than other terrestrial habitats. He explains: "Because the forest habitat is diverse it has many niches and more species than occur in environments with less height and diversity".

Improvement of forest land for wildlife does not require expensive, direct habitat measures. Instead, it can be achieved through a well designed timber management program. The chain saw is the best wildlife management tool yet invented. This paper gives quidelines on how timber and wildlife management goals can be coordinated in a way that provides continous supplies of good wildlife foods, The landowner can realize a profit from timber sales and improve wildlife habitat at the same time.

FAVORITE FOOD PLANTS

The plants selected for discussion in this paper were compilied by Martin el al (1951) who listed 34 genera of woody plants rated as top food producers in the Northeast, based on Fish and Wildlife Service food - habit studies.

Table 1 lists the 34 woody plants for the Northeast and

shows the frequency and extent to which they are used by 96 species of wildlife. Included are 18 trees, 12 shrubs, and 4 vines. The wildlife list contains 24 mammals and 72 birds, both game and nongame species.

Plants are listed from left to right by decreasing importance based on the total of the number ratings for each species. The number of animal species using a particular plant is also shown. Thus, oaks (acorns) have the highest rating (99) and are used by 38 species, greenbriers (about midway in the list) rate 34 and serve 22 species, and walnuts at end of list rate seven and serve three species. The number of listed plants used by a single wildlife species ranges from 1 to 24 and averages 7.

PREFERRED PLANTS NEED SUNLIGHT

Fourteen of the 18 trees and all shrubs and vines in Table 1 (90% of plants on list) become established, grow more vigorously, and produce more wildlife food with plentiful sunlight. Foresters call such plants intolerants because they are intolerant of shade. Shade-tolerant and shade-intolerant tree species tend to group themselves into recognized forest types. In general, the intolerant types provide better wildlife habitat. McCaffery (1976) produced evidence of this. Using deer track counts as an index to

populations and habitat use in Wisconsin, he showed a direct relation between deer abundance and the percent of forest in intolerant types. For example, deer were six times more abundant in the aspen type (intolerant) than in the northern hardwood type (tolerant).

Growing conditions for understory vegetation are enhanced when direct sunlight reaches the forest floor. Deer browse studies on the National Forests in the Northeast substantiated this point (Shaw, 1972). There was a direct relation between the number of twigs per acre available to deer (1 to 5 feet from ground) and the percent of crown closure exhibited by overstory trees as forest stands mature. A completely open canopy created by clearcutting resulted in over 200,000 twigs per acre for the first few years following regeneration. Available twigs decreased consistently through the sapling, pole, and sawtimber size classes. Mature stands with nearly complete crown closures showed an average of only 15,000 twigs per acre -- a reduction of over 90 percent during the 60 to 100+ year rotation.

The same studies revealed that deer have a definite preference for noncommercial woody plants typical of the shrubs, vines, and small trees listed in Table 1. These "brush in the sun" species with little or no timber value comprised 63 percent of the twigs available but 80 percent

of all twigs browsed. This means that seedlings desired for timber purposes have a better chance to become established and grow out of the deer's reach when they are intermixed liberally with nontimber species (Shaw and Ripley, 1966).

Sugar maple, beech, hemlock and red spruce are the only good wildlife food trees that can reproduce seedlings in the presence of dense shade. Once established, however, all except beech will grow faster when partial sunlight is introduced. In the colder climates where these tolerant species predominate silvicultural systems must be employed to insure their regeneration and growth.

SILVICULTURAL SYSTEMS

In order to relate forest management practices to growth of woody plants of high wildlife food value, some clarification of terms is in order. Technical information used here is based on USDA Handbook No. 445 (USDA, Forest Service, 1973), except where noted. With so much public outcry recently on cutting practices, especially clearcutting, it is essential that all segments of society have a common understanding of forestry terms.

A silvicultural system is a process whereby forests are tended, harvested, and replaced to produce a forest of distinctive form. Systems are classified according to the method of harvest

cutting used when the stand is reproduced. A stand occupies a minimum of one acre and is at least 10 percent stocked with trees of any size (Schwartz el al., 1976). It is also sufficiently uniform in species composition, age arrangement, and condition to be distinguishable from adjoining forest areas. For economic logging the minimum size of a stand to be cut is usually five to ten acres.

Stands are either even-aged or uneven-aged. An even-aged stand is composed of trees of roughly the same age, the age spread generally being ten years or less. An uneven-aged stand has intermingled trees or groups of trees that differ markedly in age. Age groups from seedlings to mature trees are frequently present in the same stand.

The point often overlooked is that both systems aim for the same end result, which is a many-aged forest for an ownership or management unit where the principle of sustained yield is applied. Sustained yield is the achievement in perpetuity of regular, periodic outputs of forest products and services without impairment of land productivity (U.S. Congress, 1960). The only difference between the two approaches is the distribution of tree ages and sizes within individual stands. In both situations there may be the same number of trees represented by the same diameter classes over the management unit.

It is only a matter of arrangement. The choice often depends on species desired, markets available, and feasibility of logging.

Even aged stands originate by cutting all trees in one operation (clearcutting in blocks, patches, or strips), by cutting in two or three stages spacing the cuts a few years apart (shelterwood system), or by cutting all but a few seed-producing trees (seed-tree system). When using the shelterwood system a two-cut shelterwood is best for wildlife because of the quick development of understory plants following the first cut which typically removes about half the volume of overstory trees. The clearcutting, seed-tree, and two-cut shelterwood systems all create conditions favorable to the development and growth of light-demanding woody plants that make up 90 percent of the good food producers shown in Table 1. These even-aged systems, then, should receive heavy emphasis in wildlife management.

The selection system is used to maintain uneven-aged stands. This is done either by individual tree selection where the trees are removed singly and periodically to form a mixture of diameter classes, or by group selection where trees are harvested periodically in small groups, resulting in openings not exceeding an acre or two in size. The selection system favors shade-tolerant species, only a few of which are good wildlife food plants, but it has a definite

place in multiple-use management, particularly for maintaining a balanced wildlife habitat.

In addition to favoring tolerant plants where needed, the selection system assures a continuous on-site supply of acorns, nuts, and other tree fruits from larger trees. This system is also practiced along roads, recreation areas, and scenic vistas to retain natural beauty and variety, and adjacent to permanent streams and ponds where a continuous vegetative cover is needed to prevent siltation from logging.

DIVERSITY AND INTERSPERSION

No silvicultural system or combination of systems is universally good or bad for wildlife. Management strategies depend on local situations, and usually have to be handled case by case. Management has to be geared to such things as landowner objectives, the wildlife species to emphasize, local timer type and tree species present, logging systems available, and markets to handle certain tree species and diameters.

There are two basic principles, however, that should be applied whenever timber sales are used as a tool to improve wildlife habitat. These are diversity and interspersion. Adherence to these principles often has more favorable impacts on wildlife than the silvicultural systems used.

Diversity is a measure of plant species richness and equitability, and is enhanced by the presence of edges. Edges occur where different plant communities such as timber types or successional stages within them (i.e. stands representing different tree species and ages) come together. Forest birds and mammals use these edges more frequently than interior habitats because they have simultaneous access to more than one kind of plant community, and there is usually a greater richness of food plants found in the edge itself.

A simple example of how diversity and edge influence wildlife behavior is presented in an Ontario study of breeding birds (MacDonald 1965), Stands of hardwoods mixed with pine (high diversity) contained 36 pairs of nesting birds per 10 acres represented by 18 species. Semi-open pine stands (medium diversity) had 15 pairs per 10 acres representing 6 species. Solid pine plantations (low diversity) had only one pair per 10 acres.

Interspersion is the degree to which diversity is repeated and randomly mixed within the mobility range of the wildlife species under consideration. To illustrate, a landowner has an 80 acre woodlot and wants to encourage deer, rabbits, redstarts, and chestnut-sided warblers.

All these prefer "brush in the sun" which can be provided by regeneration cuts resulting in even-aged stands. To gear up for practicing sustained-yield the forester decides that 12 acres should be regenerated now. Clearcutting is selected because of the wildlife objectives and the lack of young trees needed to practice sustained yield management.

Should the forester lay out one 12-acre cutting site, or four scattered three-acre sites? To improve interspersion he would select four cuts because the diversity created by clearcutting shows up in four places instead of one. Diversity and interspersion combine to create a good assortment of niches where a wide variety of wildlife species can find suitable places to feed, hide, rest, sleep, play, and breed within their home ranges.

A PLAN TO ILLUSTRATE PRINCIPLES

Figure 1 presents a management plan for an 80-acre poletimber woodlot in Northeastern hardwood country. Each numbered stand is 2 to 5 acres in size. The plan is designed to illustrate just one way that the principles discussed here can be put in practice.

Two silvicultural systems (selection and clearcutting) are used, small conifer plantings are established to improve species composition and provide cover, and scattered areas

are developed and maintained in early-succession plants. Timber cuts are scheduled in time and place to create diversity and interspersion. All these things give assurance that timber products and improved wildlife habitat can be sustained as long as the plan is followed.

The plan is on a ten-year cutting cycle and an 80 year rotation. After the second or third harvest (20 or 30 years hence):

(1) Hardwoods are growing on approximately 85 percent and conifers on 15 percent of the tree-growing acreage.

(2) Even-aged stands comprise 70 percent, selectively cut stands 25 percent, and permanent openings (log landing and daylighted log roads) 5 percent of the total acreage.

(3) Age class distribution on forest land is approaching one half sawtimber (12 inches diameter to maturity), one-fourth poletimber (5 to 11 inches diameter), with one-fourth in the seedling-sapling stage (4 inches and under). This distribution is what would be expected when sustained-yield management is practiced.

If this 80-acre woodlot were divided roughly into four parts, each 20-acre section after the second cut would contain a new

clearcut, at least one conifer plantation, a stand permanently dedicated to selection cutting, and a stretch of daylighted log road maintained in low, early-succession plants. Here are all the ingredients of a productive habitat; namely, good diversity, good interspersion, ample cover, balance of age classes, lots of edges, and assurance of continous supply of preferred wildlife foods. Timber management has created a much improved environment for both game and nongame wildlife. Birders, hunters, and students of fauna and flora are among those who reap the benefits.

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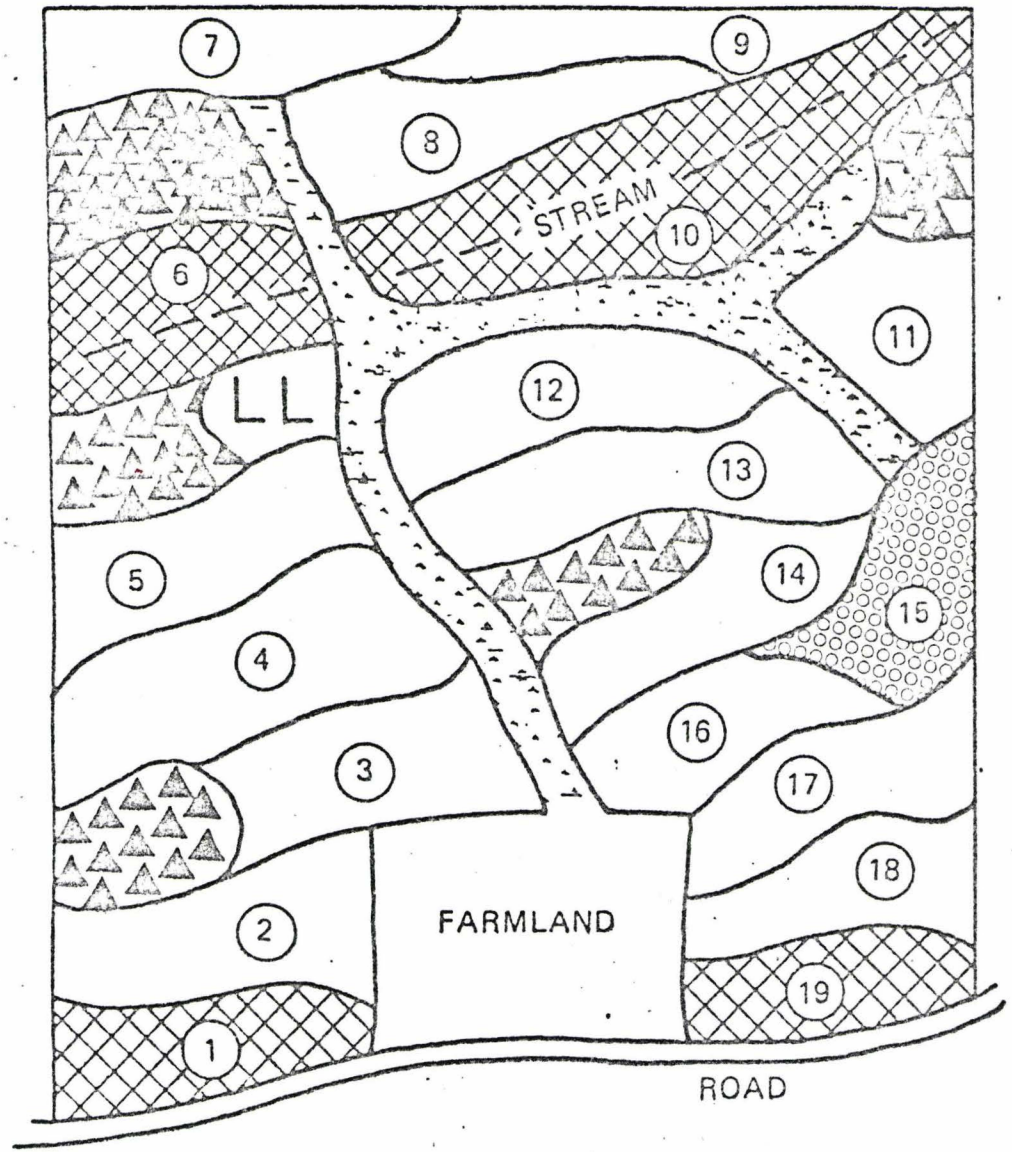

FIRST OPERATION

Selectively cut 1, 6, 10 and 19

Clearcut 15

Clearcut and plant conifers

"Daylight" log roads and seed roadbed to legumes

LL Clearcut log landing and seed to legumes after sale

TEN YEARS LATER

Selectively cut 1, 6, 10 and 19

Clearcut 4 and 9

EACH TEN YEARS THEREAFTER

Selectively cut 1, 6, 10 and 19

Clearcut two units not adjoining units clearcut 10 or 20 years before

Thin pine plantations

Fig. 1 A wildlife-oriented timber management plan for an 80 acre poletimber woodlot typical of Northeastern hardwood country.

WOODY PLANTS OF THE NORTHEAST AND THEIR FOOD VALUE FOR WILDLIFE[1]

NUMBER RATING

	Approximate Percent of Diet (Seasonally)
1	½ to under 2
2	2 to under 5
3	5 to under 10
4	10 to under 25
5	25 to under 50
6	50 and over

	Oaks (Quercus)	Blackberries (Rubus)	Cherries (Prunus)	Dogwoods (Cornus)	Grapes (Vitis)	Pines (Pinus)	Blueberries (Vaccinium)	Maples (Acer)	Sumacs (Rhus)	Beech (Fagus)	Mulberries (Morus)	Birches (Betula)	Elderberries (Sambucus)	Serviceberries (Amalanchier)	Blackgum (Nyssa)	Greenbriers (Smilax)	Poison Ivy (Toxicodendron)	Cedars (Juniperus)	Virginia Creepers (Parthenocissus)	Spruces (Picea)	Aspens (Populus)	Hazelnuts (Corylus)	Hickories (Carya)	Hollies (Ilex)	Ashes (Fraxinus)	Elms (Ulmus)	Willows (Salix)	Hemlock (Tsuga)	Firs (Abies)	Hawthorns (Crataegus)	Alders (Alnus)	Mountain Ashes (Sorbus)	Tuliptree (Liriodendron)	Walnuts (Juglans)	Total Plant Genera Used
GAME AND FUR MAMMALS																																			
Bear, Black	5		5		3		4			5					3	2		1						1					3						10
Beaver								2				3		3				1			4	3			2		3				2				9
Deer, White-tailed	4	3	2	2		1	3	4	2	1		2		1	3	3		1			3	1		2	2	1	2	3	2	1	2				24
Fox, Gray			1		1																								1						3
Fox, Red		1	2		1		1																												4
Hare, Varying	1		1			5		1	2			3								4	3	3				4				2					11
Moose		1	2	3		1		2	1			3		2							3	2			1		4		4		2	4			15
Muskrat	1																										1								2
Opossum	1	1			2						2					1																			5
Rabbit, Cottontail, Eastern		3	2	3					5																										4
Rabbit, Cottontail, New England	1		2	1			2	2	1			2															1								8
Raccoon	5				2					1						1						1	1	1											7
Skunk, Striped			1		3		2																						1						4
Skunk, Spotted					2						2																								2
Squirrel, Fox	4	2	2	2	2	1	1	3		3	2		1	2	2	1						2	4		2	3	1						1	3	21
Squirrel, Gray	5	1	1	2		2		3		3	2				2					2			4			1							1	2	14
Squirrel, Red	3		2			2		3		3				3						3		2	4			3			2				2	2	13
OTHER MAMMALS																																			
Chipmunk, Eastern	3	2	2	2				3		3								2				3	3												9
Chipmunk, Least		4					4																												2
Mouse, Meadow	2							2													2					2									4
Mouse, Pine																													2						1
Mouse, White-footed	3		2	1		2	3	2																								2			7
Porcupine	2					3		4		4		3								3	2			2			4	3							10
Squirrel, Flying	3							2		4																									3
GAME BIRDS																																			
Duck, Mallard	2																																		1
Duck, Wood	2			4	2					2														1	3										6
Grouse, Ruffed	3	3	3	3	3		3	2	3	3		3	2	2		2					5	3				3			3						17
Grouse, Sharp-tailed		2	2									5									2	1								3	4				7
Pheasant, Ring-necked	2	4	2		3				2				2																						6
Prairie Chicken	2			1					1			2				1						1													6
Quail, Bobwhite	2	2		1	2				2								2							2											7
Turkey	5	2		2	4		2							1	1	1								1											9
Woodcock		1																																	1
OTHER BIRDS																																			
Blackbird, Rusty	1	1			1					1			1																							5
Bluebird		1	1	2	1				2				1	1			1	2	2																	10
Bunting, Indigo		1											1																							2
Cardinal		1		3	4				2		2			1		1									1								2			9
Catbird		4	3	2	2		2		2		1		2	2		2		1	1				1													13
Chat		4					2						2																							3
Chickadee, Black-capped						3						2					2													2	2					5
Chickadee, Hudsonian						2														2										1						3
Creeper, Brown						2																														1
Crossbill, Red						6														2										2	1					4
Crossbill, White-winged						4	1													5										3	2					5
Crow, Common	2	1	2	1	1			1		2			1		1	1		1																		11
Crow, Fish		3			1		1		1		3				5																					6
Finch, Purple			3	2	1			2		1		1				1	3							2	4							3			12
Flicker, Yellow-shafted	1	1	2	2	1		1		1				1	2	1	4	1	2					1												14
Flycatcher, Crested		1	1	1	1		1				1							2		2															8
Grackle, Common	3	2	1		1					1	1																									6
Goldfinch, Common						1		1																	1					2		1			5
Grossbeak, Evening		1	4	5				5																1							2				6
Grossbeak, Pine		4		2		5		3									3		1					2					1		3				9
Grossbeak, Rose-breasted	1	2	3						2	1		3	1										2		2										9
Jay, Blue	5	2	1		1		1		2	1			1																							8
Junco						1			1								1																			3
Kingbird		1	2	2	1					1		1																								6
Mockingbird		2	1	1	2				2		2		2		2	3		2	3				3													12
Nuthatch, Red-breasted						5		2												2																3
Nuthatch, White-breasted	4					2				1		1							1				1													6
Oriole, Baltimore		2	2		1		2				2			2																						6
Oriole, Orchard		1	2		1						2																									4
Phoebe		1	1				1		2			1				1							1													7
Redpoll, Common											4																				4					2
Robin		2	4	3	2		1		3		1		1	1	3	1		2	2				1						1							15
Sapsucker, Yellow-bellied	2					2		2		2		2						2		2			2	2	2	2			2				2		13
Siskin, Pine						3						4															4									3
Sparrow, English											1														1											2
Sparrow, Fox		3			1							2				1	1		2										4						7
Sparrow, Henslow		2																																	1
Sparrow, Swamp													1																						1
Sparrow, White-throated		1	1	1	2		1						1				2							1											8
Starling	1		3	1	1				3		2		2		2		2	1	1																	11
Swallow, Tree				1														2	1																3
Tanager, Scarlet		2	1		1	1			1		1		1	1	1																				9
Thrasher, Brown	2	3	3	2	1		2		1		1		2	1	2	1	1	1																		14
Thrush, Gray-cheeked		1	2		3	2	2								2	1							1													8
Thrush, Hermit			1	2	2		1		2				1	2	1	2		1	1				3													12
Thrush, Olive-backed		1	3	2	2				1				2	1	1	1			2														1			11
Thrush, Veery		2	1	3			2		1				2	2					1														1			9
Thrush, Wood		2	2	3	2		1				2		1	1	2				2				1													11
Titmouse, Tufted	3	2			1		1			3	1		1	1																						8
Towhee, Eastern	3	2	1		1		2							1																							6
Vireo, Philadelphia				2	1																															2
Vireo, Red-eyed			1	2					1				1		1																						5
Vireo, Warbling			1	3					1																												3
Vireo, White-eyed		1											1				1		1					1													5
Warbler, Pine				2	1	3			1																													4
Warbler, Myrtle						1											2	2							1													4
Waxwing, Cedar		2	4	3	2						2		1	2	1	1	1	5						1	1													13
Woodpecker, Downy	1			2										1			3		1																			5
Woodpecker, Hairy			1	1									1	1			2		1																			6
Woodpecker, Pileated				1	3										3	1	1		2					2													7
Woodpecker, Red-bellied	4		2	1	3	2				1	2		1		1		2		2				1	2													13
Woodpecker, Red-headed	4	1	2		1						2		1																								6
Wren, Carolina	1					1											1																				3
Total of Plant Ratings	99	95	95	85	80	63	51	50	48	46	42	41	40	39	37	34	33	33	31	26	26	23	23	23	22	22	21	19	18	17	17	15	14	7	
Total Wildlife Species	38	50	49	42	46	26	28	20	28	20	26	15	29	26	21	22	21	18	20	10	9	12	9	16	14	11	9	7	8	9	7	6	8	3	

[1]Principal Reference: AMERICAN WILDLIFE AND PLANTS by Martin, Zim, and Nelson (McGraw-Hill, 1951)